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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/552,582

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Tomohiro Iwasaki

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07/02/2008

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EXAMINER

SUMMONS, BARBARA

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/552,582	Applicant(s) IWASAKI ET AL.	
	Examiner BARBARA SUMMONS	Art Unit 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2008 (RCE & submission/amend.).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/28/2008 has been entered.

Withdrawn Claim Rejections - 35 USC §§ 102 and 103

2. Applicants' amendment and arguments received 4/28/2008 have overcome each of the prior rejections, and they have all therefore been withdrawn.

New Grounds of Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 10 and 12 are rejected under 35 U.S.C. § 102(e) as being anticipated by Milsom et al. U.S. 2006/0131990 (of record).

Note that because the PCT application upon which the Milsom application is based published in English, the effective filing date of the Milsom application under § 102(e) is Dec. 4, 2003.

Fig. 2 of Milsom et al. discloses an acoustic mirror type thin film bulk acoustic resonator (FBAR) and filter using it (see e.g. claim 12), the resonator comprising: a substrate 9; an acoustic mirror layer 10 disposed on the substrate, the acoustic mirror layer including a plurality of impedance layers 11, 12 alternately having a high acoustic impedance 11 and a low acoustic impedance 12 (see section [0029], lines 2-4); and a piezoelectric thin film vibrator disposed on the acoustic mirror, the piezoelectric vibrator including a lower electrode 13, a piezoelectric thin film 14, and an upper electrode 15; wherein an uppermost impedance layer 12 of the acoustic mirror contacts the lower electrode 13 and is a low acoustic impedance layer (ibid.); wherein the lower electrode is molybdenum (see section [0033], lines 3-4) which is a different material than the low acoustic impedance layer 12, which is silicon dioxide (see section [0033], lines 7-10), contacting the lower electrode 13; wherein a sum of the thickness T4 of the lower electrode being 300nm (section [0033], the last six lines thereof) and the thickness T3 of the upper of the upper electrode being 200nm, is 500nm, the total thickness of the vibrator with the thickness of the piezoelectric film is $200(\text{nm}) + 300 + 1410 = 1910\text{nm}$, so that the thickness of the sum of the electrodes 500nm is approximately 26% of the thickness of the vibrator, which is in the recited range; wherein the thickness of the lower electrode is larger than the thickness of the upper electrode in order to increase the band ratio (a.k.a. the bandwidth) of the resonator and filter using it (see e.g. section

[0028], the last 8 lines thereof and the entire abstract) versus a resonator/filter having a lower electrode with a thickness equal to that of the upper electrode.

Regarding claim 10, the filter using the resonator is a ladder type filter (see section [0032], the last two lines thereof).

Regarding claim 12, Milsom discloses a communication apparatus that uses its example of a TX band of a UMTS 3GHz standard (see sections [0032] and [0002]-[0003]).

New Grounds of Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 2, 3 and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Milsom et al. U.S. 2006/0131990 (of record) taken alone.

Milsom et al. discloses the invention as discussed above, except for explicitly disclosing the thickness of the acoustic mirror low acoustic impedance layers as being one fourth of the acoustic wavelength, and for explicitly disclosing its TX filter (see section [0032]) in a duplexer.

Regarding claim 11, Milsom does disclose the requirements of a high coupling factor and hence wider bandwidth in the 3GHz UMTS standard for both receive and transmit bands (see section [0003], the last three lines thereof).

The Examiner Takes Official Notice that one quarter wavelength thick acoustic mirror layers would have been an extremely well known standard in the art of solidly mounted FBARs [see other art of record as evidence e.g. the reference to Aigner et al., applied below, at equation (1)].

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the FBAR filter of Milsom et al. (Fig. 2), if even necessary, by having used it in a duplexer and by having provided that the low impedance acoustic mirror layers 12 would have been one quarter wavelength thick, because Milsom is silent as to the thickness of its mirror layers thereby suggesting to one of ordinary skill in the art that any well known thickness, such as the extremely well known one quarter wavelength standard, would have been usable therewith, and because Milsom explicitly suggests its filter as a TX filter in the 3GHz UMTS standard which also includes an RX filter (see section [0032] and the last three lines of section [0003]), which would have suggested to one of ordinary skill the well known intended use of such filters in duplexers having both a TX and RX filter by definition.

7. Claims 4-9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Milsom et al. U.S. 2006/0131990 (of record) in view of Aigner et al. U.S. 6,841,922.

Milsom et al. discloses the invention as discussed above, except for the low acoustic impedance layers being either less than a quarter of a wavelength thick (see claims 4-5), or more than a quarter wavelength thick (claims 6-7), or the low acoustic impedance layers and the high acoustic impedance layers having a thickness different from a quarter wavelength (claims 8-9).

Aigner discloses that it would have been known to increase the thickness of the low acoustic impedance layers from the standard quarter wavelength thickness while correspondingly reducing the thickness of the high acoustic impedance layers or vice versa (see col. 3, lines 58-65), for example, depending upon technological limitations in manufacturing of the materials used as the mirror layers or the desirability of reducing parasitic capacitances from metal mirror layers, or creating temperature stable devices (see e.g. col. 3, lines 44-57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the acoustic mirror type FBAR of Milsom (Fig. 2) such that the acoustic mirror layers would have had thicknesses different from the standard of a quarter wavelength either by having thicknesses greater than or less than a quarter wavelength, because Milsom is silent as to the exact thicknesses of its mirror layers thereby suggesting to one of ordinary skill in the art that any well known optimal thicknesses such as those greater than or less than the standard quarter wavelength as suggested by Aigner (col. 3, lines 58-65), would have been usable

therewith, and wherein Aigner explicitly suggests such optimization (ibid.) based upon providing advantageous benefits as temperature stability, reduced parasitic capacitance or improved ease of manufacturing (col. 3, lines 44-57) which would have been known desirable results to one of ordinary skill in the art.

Response to Arguments

8. Applicant's arguments with respect to claims 1 and 10-12 based on the Weber, Ella and Tikka references have been considered but are moot in view of the new ground(s) of rejection. As noted above, the arguments based on the claims as amended were persuasive and all of the previous rejections have been withdrawn.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Milsom et al. WO 2004/055982 shows that the PCT application of which the US application 2006/0131990 applied above is a 371, published in English and is therefore applicable under § 102(e).

Zimnicki et al. U.S. 6,249,074 discloses an air-gap or acoustic mirror type FBAR having a lower electrode thicker than an upper electrode thereof (see col. 3, lines 13-16, 54-55 and 60-67 and col. 4, lines 1-4 and 32-34).

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10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BARBARA SUMMONS whose telephone number is (571)272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bs
June 30, 2008

/Barbara Summons/
Primary Examiner, Art Unit 2817